Patent claims

1. A T-cell epitope having an amino acid sequence ILVPKVSGL, RLVWACVGV, HLFNRAGTV, YLRREQMFV, TLQANKSEV, ILEDWNFGL, SLWLPSEATVYL, NLASSNYFPT, TLTADVMTYI, YLPPVPVSKV, YDLQFIFQL, ICWGNQLFV, FYNPDTQRL, MHGDTPTLH, ETTDLYCY, QAEPDRAHYN, SMVTSDAQI, and/or a functionally active variant thereof.

2. The T-cell epitope as claimed in claim 1, characterized in that said variant has a sequence homology to ILVPKVSGL, RLVWACVGV, HLFNRAGTV, YLRREQMFV, TLQANKSEV, ILEDWNFGL, SLWLPSEATVYL, NLASSNYFPT, TLTADVMTYI, YLPPVPVSKV, YDLQFIFQL, ICWGNQLFV, FYNPDTQRL, MHGDTPTLH, ETTDLYCY, QAEPDRAHYN or SMVTSDAQI of at least approx. 65%, preferably at least approx. 75% and in particular at least approx. 85% at the amino acid level.

3. The T-cell epitope as claimed in claim 1, characterized in that said variant is structurally homologous to ILVPKVSGL, RLVWACVGV, HLFNRAGTV, YLRREQMFV, TLQANKSEV, ILEDWNFGL, SLWLPSEATVYL, NLASSNYFPT, TLTADVMTYI, YLPPVPVSKV, YDLQFIFQL, ICWGNQLFV, FYNPDTQRL, MHGDTPTLH, ETTDLYCY, QAEPDRAHYN or SMVTSDAQI.

4. The T-cell epitope as claimed in any of claims 1-3, characterized in that the T-cell epitope is a cytotoxic T-cell epitope.

5. A compound comprising a T-cell epitope as claimed in any of claims 1 to 4, wherein the compound is not a naturally occurring L1 protein of a papillomavirus and not an exclusively N-terminal or an exclusively C-terminal deletion mutant of a naturally occurring L1 protein of a papillomavirus.

6. The compound as claimed in claim 5, characterized in that the compound is a polypeptide, in particular a fusion protein.

7. The compound as claimed in claim 5 or 6, characterized in that the compound is a polypeptide of at least approx. 50 amino acids, preferably of at least approx. 35 amino acids, in particular of at least approx. 20 amino acids and particularly preferably of at least approx. 9-13 amino acids, in length.

8. The compound as claimed in any of claims 5-7, characterized in that the compound contains a chemical, radioactive, nonradioactive isotope and/or fluorescent label of the T-cell epitope and/or of said fusion protein, and/or a chemical modification of the T-cell epitope and/or fusion protein.

9. A nucleic acid, characterized in that it codes for a T-cell epitope or a compound containing a T-cell epitope as claimed in any of claims 5-8.

10. A vector, in particular an expression vector, characterized in that it contains a nucleic acid as claimed in claim 9.

11. A cell, characterized in that it contains, preferably presents, at least one T-cell epitope as claimed in any of claims 5-8.

12. The cell as claimed in claim 11, characterized in that the cell is transfected, transformed and/or infected with a nucleic acid as claimed in claim 9 and/or a vector as claimed in claim 10.

13. The cell as claimed in claim 11, characterized in that the cell was incubated with at least one

compound as claimed in any of claims 5-8 and/or at least one complex as claimed in any of claims 15-17 containing a T-cell epitope as claimed in any of claims 5-8.

14. The cell as claimed in claim 11 or 12, characterized in that the cell is a B cell, a macrophage, a dendritic cell, a fibroblast, in particular a JY, T2, CaSki cell or EBV-transformed cell.

15. A complex comprising a T-cell epitope as claimed in any of claims 1-4 or a compound as claimed in any of claims 5-8 and at least one further compound.

16. The complex as claimed in claim 15, characterized in that the complex contains at least one MHC class I molecule, preferably as HLA A2.01 tetramer.

17. The complex as claimed in claim 16, characterized in that the said MHC class I molecule is a human MHC class I molecule, in particular an HLA A2.01 molecule.

18. A method for in vitro detection of the activation of T cells by at least one compound containing a T-cell epitope as claimed in any of claims 1-4, which comprises the following steps:

a) stimulation of cells using at least one said compound;

b) addition of at least one target cell presenting a T-cell epitope as claimed in any of claims 1-4 or a complex as claimed in any of claims 15-17, and

c) determination of T-cell activation.

19. The method as claimed in claim 18, characterized in that it comprises, after step a), the following additional step a'):

a') coculturing of the cells for at least approx. 1 week, in particular at least approx. 8 weeks, with:

(i) at least one target cell loaded with a compound as claimed in any of claims 5-8, at least one complex as claimed in any of claims 15-17, at least one capsomer, at least one stable capsomer, at least one VLP, at least one CVLP, and/or at least one virus,

(ii) at least one complex as claimed in any of claims 15-17,

(iii) and/or at least one target cell presenting a T-cell epitope as claimed in any of claims 1-4,

prior to step b).

20. A method for producing a target cell as claimed in any of claims 11, 13, 14, 18 or 19, characterized in that the target cell is incubated with at least one compound as claimed in any of claims 5-8 and/or at least one complex as claimed in any of claims 15-17 containing a T-cell epitope as claimed in any of claims 5-8.

21. A method for producing a target cell as claimed in any of claims 11, 12, 14, 18 or 19, characterized in that the target cells is transfected, transformed and/or infected with a nucleic acid as

claimed in claim 9 and/or a vector as claimed in claim 10.

22. A method for producing a target cell as claimed in claim 20 or 21, characterized in that the target cell is a B cell, a macrophage, a dendritic cell, a fibroblast, in particular a JY, T2, CaSki cell or EBV-transformed cell.

23. The method as claimed in claim 18 or 19, characterized in that instead of step a) the following step a") is carried out:

a") production and preparation of samples containing T cells and subsequent culturing.

24. An assay system for in vitro detection of the activation of T cells, comprising:

a) at least one T-cell epitope as claimed in any of claims 1-4, at least one compound as claimed in any of claims 5-8, at least one vector as claimed in claim 10, at least one cell as claimed in any of claims 11-14, and/or at least one complex as claimed in any of claims 15-17, and

b) effector cells of the immune system, preferably T cells, in particular cytotoxic T cells or T helper cells.

25. The use of at least one T-cell epitope as claimed in any of claims 1-4, at least one compound as claimed in any of claims 5-8, at least one vector as claimed in claim 10, at least one cell as claimed in any of claims 11-14, and/or at least one complex as claimed in any of claims 15-17 for causing or detecting an immune response.

26. A medicament or diagnostic agent, comprising at least one compound as claimed in any of claims 5-8, at least one vector as claimed in claim 10, at least one cell as claimed in any of claims 11-14, and/or at least one complex as claimed in any of claims 15-17 and, where appropriate, a pharmaceutically acceptable carrier.

27. The medicament or diagnostic agent as claimed in claim 26, characterized in that at least one compound as claimed in any of claims 5-8, at least one vector as claimed in claim 10, at least one cell as claimed in any of claims 11-14, and/or at least one complex as claimed in any of claims 15-17 is present in solution, bound to a solid matrix and/or mixed with an adjuvant.

Add a1

Add c2